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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/944,508	08/30/2001	Warren M. Farnworth	3393.6US (97-324.6)	4342

24247 7590 06/13/2002

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EXAMINER

FULLER, ERIC B

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 06/13/2002

6

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/944,508

Applicant(s)

FARNWORTH, WARREN M.

Examiner

Eric B Fuller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 April 0402.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 1. 6) ☐ Other: _____

DETAILED ACTION

Terminal Disclaimer

The terminal disclaimer filed on April 4, 2002 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of Application Number 09/339,015, now Patent Number 6,350,494 B1, has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watts, Jr. et al. (US 6,276,589 B1).

Watts teaches a process where a continuous stream of charged solder droplets is produced (column 3, lines 40-45). Heaters are used to melt the solder in the reserve and maintain it in the liquid state (column 3, lines 55-65). A piezoelectric crystal vibrator is used to induce a standing pressure wave on the solder, thus producing droplets (column 3, lines 50-55). When ejected, a charge is selectively applied to the solder droplets (column 4, lines 10-12). A bias is used to deflect some of the droplets in a certain dimension and onto a substrate (column 4, lines 15-30). Additionally, some of

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the droplets are prevented from reaching the substrate as they are passed undeflected into a gutter. The deflection is programmably controlled (column 4, lines 13-34).

As to claim 1, the reference fails to teach that the deflection occurs in a first and second dimension. However, it is taught in figure 1 that deflection plates (16,18), situated to be perpendicular to the Y-axis, are used to deflect the solder in the Y direction while the substrate is moved in the x direction. One of ordinary skill in the art would recognize, from the teachings of Watt, that the addition of two more deflections plates, that are perpendicular to the X-axis, would allow one to deflect the solder droplets in the X direction as well. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to deflect the solder of Watts in two dimensions as opposed to only one. By doing so, the need for substrate movement is eliminated and the droplet placement is more easily and accurately controlled.

As to claims 5 and 6, Watts teaches that the frequency of the piezoelectric crystal, and the diameter of the orifice, are selected such that consistent diameter droplets are formed that are within the applicant's claimed range (column 6, lines 15-40).

As to claim 7, it is taught that the desired pattern is what determines if the droplets are caught by the gutter (blanked) or allowed to reach the substrate (column 7, lines 40-50). Figure 1 shows horizontal lines being produced, wherein the absence of solder between the endpoint of the previous horizontal line and the starting point of the next horizontal line shows that it is not desirable to have solder between these two

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points. Therefore, it would have been obvious to one skilled in the art to blank the solder stream when the steam is positioned between these two points.

As to claim 8, examiner admits that Watts teaches that it is the undeflected droplets that are blanked. However, it is the examiner's position that to allow the droplets to fall undeflected into a gutter that is positioned directly under the stream or to deflect the stream into a gutter that is positioned slightly away from directly under the stream are functionally equivalent to each other, as both act to prevent solder from reaching the substrate. To use either method would have been obvious at the time the invention was made to a person having ordinary skill in the art with a reasonable expectation of success.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watts, Jr. et al. (US 6,276,589 B1) as applied to claim 1 above, and further in view of Smith et al. (US 5,560,543).

In the event that applicant disagrees with the functionally equivalent argument presented for claim 8 above, examiner points to the teachings of Smith. Smith teaches that when deflecting electrically charged materials between a substrate and a catcher, for cases where static charge build-up can damage sensitive substrates, the charged droplets are deflected and caught by a catcher and the uncharged droplets are allowed to reach the substrate. From this, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to deflect the charged droplets into

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the gutter of Watts while having the uncharged droplets be allowed to pass on to the substrate. By doing so, substrate damage by static charge is prevented.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (703) 308-6544. The examiner can normally be reached on Tuesday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached at (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



EBF
June 12, 2002



MICHAEL BARR
PRIMARY EXAMINER